

# Species

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# First photographic evidence of black giant squirrel *Ratufa bicolor* (Sparrman, 1778) in Makawanpur District, Nepal

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## ABSTRACT

The black giant squirrel (*Ratufa bicolor*), a Globally Near Threatened species has been the first recorded sighting in Nepal's Makawanpur district. We present the photographic record of two black giant squirrels in lowland broad-leaved forest at 592 meters. Previously, evidence of the black giant squirrel in Nepal was primarily confined to lowland and mid-hill broad-leaved forests in central and eastern parts of the country. Observations in Makawanpur of central Nepal suggest a potential range expansion of the black giant squirrel. Research suggests that this species is found in scattered, restricted areas beyond protected zones, highlighting the urgency of conservation initiatives and additional research.

**Keywords:** Black giant squirrel, *Ratufa bicolor*, broad-leaved forest, tropical zone, Nepal

## 1. INTRODUCTION

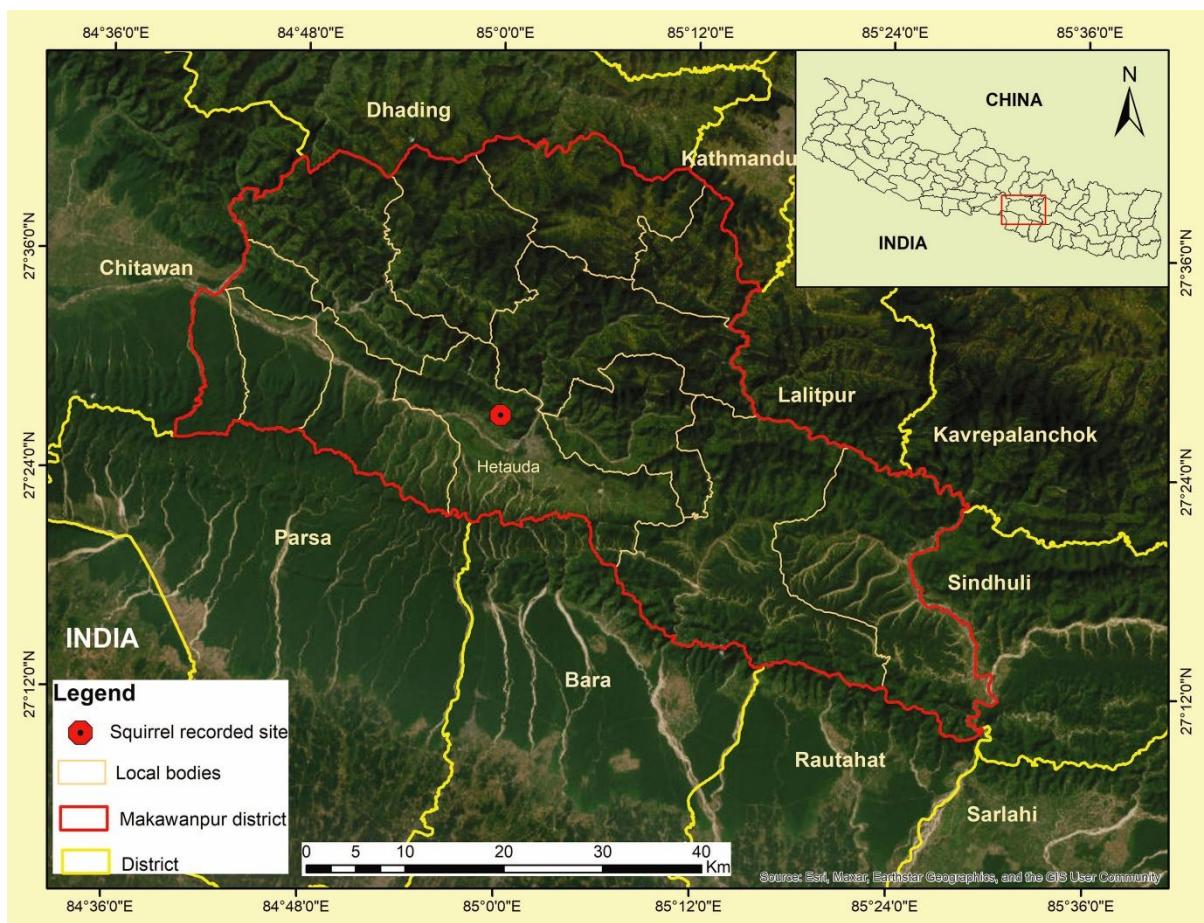
Black giant squirrel (*Ratufa bicolor*) is a large tree-dwelling squirrel found in northern south Asia, southern China, and across most of mainland and western insular southeast Asia (Kong et al., 2015). Within South Asia, this species has been documented in various regions including Bangladesh, Bhutan, India, and Eastern Nepal, typically inhabiting elevations ranging from 500 to 2,500 meters (m) (Molur et al., 2005; Duckworth and Molur, 2016; Kumar et al., 2022). This squirrel is one of the largest squirrels found in the oriental region. It weighs around 1.5 kg - 3 kg having fur of colour ranging from dark brown to black on the dorsal side while buffy white or yellow on the ventral side (Thapa et al., 2016). It is listed as near-threatened according to the International Union for the Conservation of Nature (IUCN) Duckworth and Molur, (2016) and Appendix-II of Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). In the national conservation status of Nepal, it is listed as endangered (Jnawali et al., 2011).

Till date, the black giant squirrel is primarily distributed in the lowland and hilly forests located in the eastern regions of Nepal (Jnawali et al., (2011), Ghimirey et al., (2012), Thapa et al., (2016) and also in Chitwan district of Central Nepal (Katuwal et al., 2018). In this study, we present the first photographic documentation of black giant squirrel, captured in the tropical forests of Makawanpur in central Nepal. This evidence was gathered coincidentally while conducting a bird survey.

## 2. METHODOLOGY

### Study area

Geographically, Makawanpur district lies between 84°41' to 85°31' E longitude and 27°10' to 27°40' N latitude in central Nepal (Figure 1). It has an area of 2426 square kilometers with an elevation range from 166m to 2584m. It covers three climatic zones: tropical (166m – 1000m), sub-tropical (1000m – 2000m), and temperate (2000m – 2584m) (DDC, 2015; Chapagain et al., 2016). The district includes 10 local bodies comprising one sub-metropolitan city, one municipality, and eight rural municipalities.



**Figure 1** Map of Makawanpur district of Nepal showing location of black giant squirrel recorded site.

### Data collection

For the survey of birds, we walked along the trail in Punya Kshetra Religious Forest (PKRF) of Makawanpur in morning time from 7.00 a.m. to 10.00 a.m. We took photographs of birds and also animals sighted by Digital Single-Lens Reflex (DSLR) camera (Figure 2). Once we sighted the species, Global Positioning System (GPS) coordinates and elevation data were recorded using a handheld Garmin GPS device.



**Figure 2** Full image of black giant squirrel at PKRF, Makawanpur, Nepal. (Photo: © Hari Sharan Giri)

### 3. RESULTS

A total of 2 individuals of black giant squirrels were photographed with 1 video of 23 seconds long on 29th July, 2023 at 8:30 A.M. The sighting occurred at 85°0'3" E longitude and 27°27'11" N latitude, at an elevation of 592m above sea level. It was situated directly behind a religious temple in Hetauda city known as Punya Kshetra. The location was a broad-leaved forest dominated by sal (*Shorea robusta*) and saj (*Terminalia tomentosa*) along with other tree species such as bhalayo (*Semecarpus anacardium*), botdhayero (*Lagerstroemia parviflora*), khamari (*Gmelina arborea*), kumbhi (*Careya arborea*). We sighted the squirrels on the kusum (*Schleichera oleosa*) tree which was near a small stream. Some other fruiting trees were present along with kusum tree which were bel (*Aegle marmelos*), rudraksh (*Elaeocarpus sphaericus*), mango (*Mangifera indica*), avocado (*Persea americana*). The squirrels were observed jumping from one tree to another (Figure 3).



**Figure 3** Two black giant squirrels lying on a tree (indicated by arrows) at PKRF, Makawanpur, Nepal. (Photo: © Hari Sharan Giri)

#### 4. DISCUSSION

*Ratufa bicolor* largely prefers intact, natural forests of evergreen/semi-evergreen and deciduous nature in lowlands and temperate conifer forests with increasing elevation (Duckworth and Molur, 2016). Our photographic record was first obtained in Makawanpur district of Nepal at an altitude of 592m. Prior sightings were reported in lowland eastern Nepal at 210m in Patnali forest, Dharan Katuwal et al., (2018), in mid-hill eastern Nepal at 380m in Ilam Baral, (2022) and 1130m -1300m in vicinity of Makalu-Barun National Park Ghimirey et al., (2012), and in central Nepal at 450m in Siraechuli, Chitwan (Katuwal et al., 2018). Our observation on central Nepal in Makawanpur district may suggest an expansion in their distribution range. Similarly, Lwin et al., (2021) observed this species at an elevation of 480m in northern Myanmar. According to its elevation varies from sea level to a minimum of 1400m, encompassing some of the most challenging terrains globally. However, Baral, (2022) states that the black giant squirrel is the largest squirrel in the world found between 210m - 2,000m above sea level in tropical, subtropical montane evergreen and dry deciduous forest to subtropical and temperate deciduous forest.

The sighting location of black giant squirrel was a lowland broad-leaved forest, dominated by *Shorea robusta* and *Terminalia tomentosa*. A team of Baral, (2022) reported this species in dense *Shorea robusta* forest in mid-hill of Ilam, Eastern Nepal. However, Ghimirey et al., (2012) reported that the squirrel inhabiting an undisturbed sub-tropical broad-leaved forest primarily dominated by *Schima wallichii*, *Bombax ceiba*, *Castanopsis spp.*, *Quercus spp.*, and *Populus ciliata*. Sengupta et al., (2016) recorded the highest number of observations of *Ratufa bicolor* near forest edges in Hollongapar Gibbon Sanctuary, Assam, India; attributing this phenomenon to the presence of distinct microclimatic conditions found at these forest edges.

The diet composition of black giant squirrel primarily consisted of fruits (both seeds and fleshy pulp) and twigs, which were the most frequently consumed plant components followed by bark and leaves. This pattern was consistent with findings from other studies on giant squirrels, highlighting a significant seasonal shift in their food preferences (Sengupta, 2023). Concluded that habitat selection is affected by numerous significant factors such as height of nesting trees, proximity to a food source (feeding tree), and distance from

buildings while other affecting factors are distance from road or forest trail and the girth at breast height of nesting tree. We found the species in habitats resembling the one where different fruiting trees were present. The use of forest canopy is crucial for survival of these squirrels as it provides them food, shelter, and safety.

Little is known about the ecology of the *Ratufa bicolor* in Nepal due to lack of targeted studies; only ad-hoc presence records and incidental sightings are available. Ghimirey et al., (2012) reported a killed specimen of this species in a cardamom plantation in eastern Nepal at 1350m. The animal was killed by a boy and hung its skin on a bamboo pole to deter chickens from entering his potato field. The boy mistakenly killed it, thinking it was a masked palm civet (*Paguma larvata*). The *Ratufa bicolor* in Nepal faces numerous threats including habitat destruction from deforestation for farming and grazing, illegal hunting for trade and sustenance, and persecution (Jnawali et al., 2011). This species is frequently misidentified as a civet, resulting in people killing them as pests. Additionally, their skin holds cultural significance as a protective ornament against spiritual forces.

## 5. CONCLUSION

This is the first photographic evidence of black giant squirrel from Makawanpur district in central Nepal as most of its presence has been documented from eastern Nepal. Research suggests that this species is mostly found in scattered and limited locations outside of protected areas, emphasizing the need for conservation efforts and further study.

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### Authors' contributions

Study design, fieldwork: ST, HSG; Writing: ST, BPP, HSG, BPB, BS

### Informed consent

Not applicable

### Ethical approval

A black giant squirrel (*Ratufa bicolor*) from Punya Kshetra Religious Forest, Makawanpur district, Nepal was observed in the study. The Animal ethical guidelines are followed in the study for species observation and identification.

### Conflicts of interests:

The authors declare that there are no conflicts of interests.

### Funding:

The study has not received any external funding.

### Data and materials availability

All data associated with this study are present in the paper.

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